NCSP Hands-On Training Prerequisite

Human Factors and Reliability: Prerequisite Reading and Quiz

Purpose: the purpose of the prerequisite reading is to begin thinking about the topics of human factors, human performance, and equipment reliability, all of which are important for criticality safety evaluations. Understanding the human role in fissile material operations is particularly significant since the human element proved to be the dominant cause of 60 criticality accidents that occurred from 1953 to 1999. The prerequisite reading will provide a foundation to understand the concepts that will be covered in the classroom portion of the training.

Instructions:

- Read the following sections of DOE-HDBK-1028-2009, *Human Performance Improvement Handbook, Volume 1: Concepts and Principles* http://www.hss.doe.gov/nuclearsafety/ns/techstds/docs/handbook/doe-hdbk-1028-2009_volume1.pdf
  - Preface — Pages v to vi
  - Overview — Pages 1-1 to 1-2
  - Perspective on Human Performance and Events — Pages 1-10 to 1-11
  - Human Fallibility — Pages 2-1 to 2-16
  - Performance Modes — Pages 2-16 to 2-20
  - Defense in Depth — Pages 3-5 to 3-8
  - Safety Culture — Pages 4-2 to 4-10
  - Human Factors and Ergonomics — Pages 5-4 to 5-6
  - Glossary — Pages i to ix
- Read pages 41 to 50 (Checking and Verification Practices) of DOE-HDBK-1028-2009, *Human Performance Improvement Handbook, Volume 2: Human Performance Tools for Individuals, Work Teams, and Management* http://www.hss.doe.gov/nuclearsafety/ns/techstds/docs/handbook/doe-hdbk-1028-2009_volume2.pdf
- Print and complete the attached quiz and bring it with you to the classroom training

Duration: 2 hours

Quiz: use the DOE handbooks to answer the following questions.

Name: _____ Date: _____

1. Human error is random.	True	False
2. Most errors can be attributed to equipment failures rather than people.	True	False
3. Human performance improvement (HPI) is equivalent to human factors.	True	False
4. The principles of HPI can be used to supplement human factors.	True	False
5. HPI can reduce errors and improve quality, efficiency, and productivity.	True	False
6. The majority of errors that result in "incidents" stem from latent organizational weaknesses rather than individual workers.	True	False
7. Error rates are unrelated to human capabilities and limitations.	True	False
8. People are generally able to pay attention to two or three things simultaneously at most.	True	False
9. Human error may increase when there is a mismatch between human limitations and environmental conditions at the job site.	True	False
10. Design flaws and maintenance errors are the most significant contributors to latent error conditions.	True	False
11. Most violations are well intentioned, resulting from a desire to get a job done.	True	False
12. Equipment reliability does *not* impact human perceptions or behavior.	True	False
13. Administrative controls are more reliable than engineered controls.	True	False
14. Human factors attempts to fit environments and equipment to human capabilities and limitations.	True	False
15. Checking and verification practices provide one mechanism to prevent or reduce mistakes.	True	False

16. Which of the following is an example of at-risk behavior on the job?
    a) Hurrying through an activity
    b) Not following a procedure when a task is perceived to be "routine"
    c) Trying to listen to someone on the telephone and someone else nearby
    d) All of the above

17. Match the following terms to descriptions of the types of errors that can occur.

Slip **Lapse** **Violation** **Mistake** **Active Error** **Latent Error** **Bias**

	Error that results from failures in memory or recall
	Observable physical action that creates immediate unwanted consequences
	Physical action fails to achieve the immediate objective
	Error that goes unnoticed at the time it occurs and has no immediate apparent outcome
	Error that involves misinterpretation or lack of knowledge, with the result that an inadequate plan is used to achieve an intended outcome
	Deliberate or intentional departure from known rules or policy

18. Which of the following explains why people commit violations?
    a) Absence of authority in the immediate vicinity
    b) Perceived low risk
    c) Precedent (we've always done it this way)
    d) All of the above

19. What are the three modes of human attention?
    a) Divided, Active, Latent
    b) Focused, Dormant, Active
    c) Focused, Divided, Selective
    d) Selective, Rule-Based, Knowledge-Based

20. Which of the following constitute flaws with engineered controls?
    a) Out-of-service equipment
    b) Excessive noise
    c) Missing or poorly designed labels
    d) All of the Above

21. What are the three Cs of a safety culture?
    a) Cognizance, Culpability, Communications
    b) Commitment, Competence, Cognizance
    c) Commitment, Culture, Credence
    d) Competence, Creativity, Culture

22. Which of the following represent areas of interest for the field of human factors?
    a) Procedures and procedure use
    b) Human-machine interface
    c) Attention
    d) Reliability
    e) Environmental conditions
    f) All of the Above

LANL Class Prerequisite

LANL class required attendees to have a good background in reactors physics, knowledge of NCS handbooks ((LA-10860-MS, LA-12808, etc.), and some practical knowledge of NCS hand calculation methods.

Sandia Class Prerequisite

Prior to obtaining unescorted access to TA-V, the following required training needs to be completed:

1. ESH100 – Please read the following document:

   
   ESH100 http://ncsp.llnl.gov/HS3201/ESH100.pdf

   Then open and print out the ESH100 exam (below), complete the exam and either scan the exam and email to Lei Wathen (lawathe@sandia.gov) or fax to Lei Wathen at (505)844-2748.

   
   ESH100 Test http://ncsp.llnl.gov/HS3201/ESH100_Test.pdf

2. RAD102 – Please read the following document. The exam is found at the end of the document, pages 36 – 40. Please print these four pages, complete the exam and either scan the exam and email to Beth Watkins (eawatki@sandia.gov) or fax to Beth Watkins at (505) 844-2748.

   
   RAD102a http://ncsp.llnl.gov/HS3201/Rad102a.pdf

3. Hazard, Emergency and Response Training (HEART) – The video and short quiz will be presented on the first morning of the course.

If you have any questions or problems with submitting your exams, please call Mary Ellen Ratzer at (505)844-2474 or email her at meratze@sandia.gov.

Please submit your exams as soon as possible for processing. Thanks!

DAF/NCERC Class Prerequisite

DAF/NCERC class required attendees to complete both NNSS GERT and Radiological Worker II (RWII) training prior class start.